FIRE REGIMES ON THE CLEARWATER AND NEZ PERCE NATIONAL FORESTS NORTH-CENTRAL IDAHO

FINAL REPORT
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INTRODUCTION

During the summer of 1993, fire history sampling was conducted in several analysis areas on the Clearwater- and Nez Perce National Forests in north-central Idaho. The goal was to determine fire regime patterns for major forest types in order to aid the development of strategies for ecosystem management. Because this large area contains considerable vegetative diversity, objectives were to select several representative sample areas and determine pre-1900 fire history, and determine the possible effects of post-1900 fire suppression. Three sample areas were chosen after consulting with national forest personnel. The first area was in a relatively high elevation old growth forest dominated by lodgepole pine and subalpine fir, adjacent to the northeastern portion of the Selway-Bitterroot Wilderness. Two low elevation analysis areas also were selected--one in highly productive mesic forests (redcedar and grand fir potential climax) in the North Fork Clearwater River drainage, and one in a warmer and drier zone dominated by ponderosa pine, Douglas-fir, and grand fir (Douglas-fir and grand fir potential climax) in the South Fork Clearwater River drainage. After data analysis, results from this sampling were factored into a previous fire regimes model that resulted after work in and around the Selway-Bitterroot Wilderness (Barrett and Arno 1991). North-central Idaho contains a wide range of vegetation types and also represents a major north-south transition zone between relatively dry and relatively moist forest types in Idaho. Consequently, the fire regimes model presented in this report (Appendix A) is somewhat preliminary, pending possible addition of future data and an upcoming classification for Inland Northwest forests (ongoing work by author in conjunction with Intermountain Research Station; projected 1996 completion date).

WHITE SAND ANALYSIS AREA

Initial sampling occurred in the White Sand Analysis Area (Powell Ranger District, CNF), in an approximately 8000 acre subunit in the Swamp- and Rabbit Creek drainages (5400-6400 ft. elev.). This area contains relatively old stands that are dominated by various combinations of lodgepole pine, subalpine fir, spruce, and Douglas-fir, with occasional western larch extending up from lower elevations in the drainage. Forest habitat types key to the subalpine fir series, and the most prevalent types are ABLA/XETE-VASC, ABLA/XETE-VAGL, and ABLA/MEFE-XETE (Cooper et al. 1987).

Sampling (Arno and Sneck 1977, Barrett and Arno 1988) at 36 sites produced 167 age class increment cores and fire scar partial cross sections. These samples yielded an apparently continuous fire history record back to about 1616. The earliest evidence of fire dated to 1503, obtained from the piths of 7 whitebark pine snags killed during the region's historic 1889 fire (Barrett 1982). In fact, archival maps indicate that this zone of northern Idaho has experienced some of the most extensive forest fires in recorded history (e.g., 1889, 1910, 1919, 1929 [Barrett 1982, Barrett unpub. data on file]). The White Sand Master Fire Chronology (1616-1985) contains 11 fires, mostly stand replacing events, for an area mean fire interval of 37 years. That is, a fire occurred somewhere in the 8000 acre area on an average of every 3 decades, and actual intervals between the fires ranged from 10 to 67 years. Five of the 11 fires in the Master Fire Chronology apparently initiated most of the age class mosaic, between 1772 and 1929, and this yields an MFI of about 40 years between major events. The last stand replacing fire occurred 8 years ago, in 1985 (suppressed at <10 ac.), but the area has not experienced an important fire in the 64 years since 1929.

In general, fire scarred trees were uncommon and most stands contained one seral age class. This pattern suggests that stand replacement, rather than

extensive underburning, was the predominant fire severity pattern in the relatively moist forests surrounding White Sand Creek. In fact, an overall lack of old scars made it necessary to incorporate the maximum ages of overmature stands (i.e., incomplete fire intervals) for computing mean interval for stand replacing fires (Barrett and Arno 1988). In terms of fire frequency at the stand level (tables 1, 1a), the estimated means for stand replacing fires were about 215 and 220 years, respectively, for the PSME-PIEL-ABLA and PICO-ABLA cover types. Since the calculations include a number of incomplete fire intervals, it is logical to question whether these means might be artificially long because of 60 years of fire suppression. However, when the calculations were based only on complete intervals occurring before 1930, the MAFI for stand replacing fires was virtually identical.

The analysis area contains a few small 2-age stands with single-fire scarred trees, usually on south-facing slopes (i.e., PICO-ABLA cover type). This suggests a burn margin effect, rather than extensive underburning--that is, small groups of scarred trees that had survived along the margins of stand replacing runs. Without 6 decades of effective fire suppression, mixed severity underburns and/or stand replacing fires (i.e., reburns) might well have occurred on some sites after the area's large fires between 1889 and 1929. For example, Barrett (1982) and Barrett (unpub. data on file) suggest that most reburns occur within 5 decades of an initial stand replacing fire. Data from the White Sand area support this interpretation, since the mean for mixed severity underburns was 39 years (range: 20-67 yr)(table 1a). Subsequently, fire hazard in lodgepole pine stands can decrease for a number of decades, followed by an increase in stand flammability during the later stages of succession (e.g. 150-300 yr)(Romme 1982, Kapler-Smith and Fischer [in prep]). In the nearby Selway-Bitterroot Wilderness, fire suppression apparently has played a role in encouraging this latter successional pathway in some stands

(Brown et al. [in prep]), and might have prolonged the existence of some relatively old lodgepole pine stands in the White Sand Analysis Area.

In addition to reburns, forest personnel recently inquired about the likelihood of "paired events" occurring in an area's fire history--for example, fires originating in post-fire fuels, then burning to adjacent older stands. This concept seems supportable: the White Sand Master Fire Chronology indicates that 7 of 10 fires between 1616 and 1929 occurred within 50 years of a previous fire. (Analysis of mosaic patterns [i.e., fire history mapping] also would help address this question, but was not a component of this contract).

The last important fire in the analysis area occurred 64 years ago, but the predominant age class became initiated after a fire in about 1772--possibly a widespread event in the upper Lochsa drainage. These 220 year old stands are among the oldest documented for lodgepole pine in northern Idaho (Barrett and Arno 1991), and rank among the longest fire intervals found for lodgepole pine in the Northern Rockies (Arno 1980, Barrett [unpub. data on file]). Fire suppression might have artificially lengthened some stand fire intervals in upper White Sand, but this remains open to question since the sampling also revealed long fire intervals before 1900. However, the stand replacing fire that was suppressed in 1985 might well have evolved into an important event, and increasingly heavy fuels in today's decadent stands (e.g., from mountain pine beetles, root rot, and subsequent windfall) clearly are setting the stage for replacement fire in the coming decades.

In terms of ecosystem management, several of the concepts discussed above might be useful for developing management strategies in the upper White Sand drainage and similar forested areas. Since the analysis area contains substantial acreages of overmature stands in a narrow corridor surrounded by Wilderness, fuel management planning should initially recognize the difficulty of defending against future wildfires. Escaped fires might readily encompass

this corridor, and any management prescriptions should first consider these unnatural and relatively indefensible boundaries. Prior to such a fire event, area mosaic management would be the most practical approach for mitigating fire spread and severity. For example, ecologically-based prescriptions might incorporate a mix of even-age silviculture (shelterwood, seed tree) and scheduled prescribed fires. The goal of such management would be fuel reduction and mosaic diversification, particularly near the intensively used Elk Summit recreation area. The fire frequency statistics and severity patterns for the area's major cover types (tables 1 and 1a, Appendix) can serve as a natural guide for selecting and scheduling various stand treatments. In terms of defining stand units, for example, silvicultural prescriptions should take into account the fact that the fire history produced a wide array of stand polygons. Moderate- to large size even age polygons predominate in the mosaic, especially on north slopes (e.g., PSME-PIEL-ABLA c.t.). However, the upper White Sand area also contains smaller (<50 ac.) patches of 2-age polygons (e.g., south-facing stands in the PICO-ABLA c.t.). In addition to treating logging slash, prescribed underburning would be ecologically appropriate on the latter site type, particularly within about 5 decades of initial harvest. In terms of underburn severity, these stands occasionally experienced relatively light and patchy underburns or, conversely, comparatively severe underburns that killed as much as 75 percent of the overstory. However, since reburn potential can remain high for a number of decades, use of prescribed fire alone to create buffers of low flammability fuels near Wilderness is a highly questionable concept.

Table 1. Fire occurrence data from 12 plots in the PSME-PIEL-ABLA cover type, White Sand Analysis Area, Clearwater National Forest.[1]

Plot No.[2]	Habitat Type[3]	Aspect	Fire Intervals UB[4]	SR[5]	MFI	Last Fire
2	Abla/Mefe-Xete	NE	-	221+	-	1772
10	Abla/Clun-Mefe	F	-	221+	-	1772
11	Abla/Xete-Vagl	E	-	221+	-	1772
21	Abla/Mefe-Xete	NE	-	164+	-	1829
22	Abla/Mefe-Xete	NE	-	221+	-	1772
23	Abla/Xete-Vasc	NE	-	164+	-	1829
26	Abla/Clun-Xete	F	-	221+	-	1772
29	Abla/Mefe-Xete	N	-	259+	-	1734
30	Abla/Xete-Vagl	N	-	241+	-	1752
31	Abla/Xete-Vagl	E	-	241+	-	1752
34	Abla/Xete-Vagl	E	-	221+	-	1772
36	Abla/Xete-Vagl	E	-	213	-	1985

MAFI, SR fires: 220 yr.

[1] Means based on non-duplicate intervals only.

[2] Plot locations on topographic maps included with this report.

[3] Acronyms follow Cooper et al. (1987).

[4] Denotes non-lethal or mixed severity underburns.

[5] Denotes stand replacing fires ("+"=incomplete interval as of 1993).

Table 1a. Fire occurrence data from 24 plots in the PICO-ABLA cover type, White Sand Analysis Area, Clearwater National Forest.

Plot No.	Habitat Type	Aspect	Fire Intervals UB	SR	MFI	Last Fire
1	Abla/Xete-Vasc	SE	28	221+	-	1800
3	Abla/Mefe-Xete	SE	20	241+	-	1772
4	Abla/Xete-Vasc	SE	-	221+	-	1772
5	Abla/Xete-Vagl	S	-	221+	-	1772
6	Abla/Xete-Vagl	SE	28	221+	-	1800
7	Abla/Xete-Vasc	S	28	221+	-	1800
8	Abla/Mefe-Xete	NE	28	221+	-	1800
9	Abla/Xete-Vasc	S	29,28	221+	-	1829
12	Abla/Xete-Vasc	S	-	117	-	1889
13	Abla/Xete-Vasc	S	20	117	69	1889
14	Abla/Xete-Vasc	NW	-	386,104+	-	1889
15	Abla/Xete-Vasc	S	-	137,249	193	1889
16	Abla/Xete-Vasc	S	-	157	-	1929
17	Abla/Xete-Vasc	NE	-	157	-	1929
18	Abla/Xete-Vagl	SE	40	104+	-	1929
19	Abla/Xete-Vasc	S	-	104+	-	1889
20	Abla/Xete-Vasc	NE	29	193+	-	1829
24	Abla/Xete-Vasc	NW	-	221+	-	1772
25	Abla/Xete-Vasc	SW	-	259+	-	1734
27	Abla/Xete-Vasc	S	-	104+	-	1889
28	Abla/Xete-Vasc	S	51,67	273,104+	91	1889
32	Abla/Xete-Vasc	W	-	241+	-	1752
33	Abla/Xete-Vasc	S	-	241+	-	1752
35	Abla/Xete-Vagl	S	-	221+	-	1772

MAFI:
SR Fires: 213 yr.
UB Fires: 39 yr.

FERN STAR ANALYSIS AREA

In the Fern Star Analysis Area (North Fork Ranger District, CNF), an approximately 5000 acre area in and adjacent to the Isabella Creek drainage was selected for sampling (1800-5000 ft. elev.). This analysis area contains relatively old, productive forests; in fact, because of historic large fires and past heavy logging in adjacent drainages, the analysis area contains one of the largest components of old growth remaining in the North Fork. Old redcedar groves occupy moist bottoms and ravines, and adjacent steep slopes are dominated by various mixes of conifers such as redcedar, grand fir, Douglas-fir, western white pine, western larch, and mountain hemlock. Redcedar and grand fir habitat types predominate, with the most common being THPL/CLUN, THPL/ATFE, ABGR/CLUN, and ABGR/ASCA (Cooper et al. 1987).

During sampling, fire scarred trees were encountered primarily in moist bottoms and draws (i.e., THPL c.t.). These scars sometimes reflected a burn margin effect from nearby stand replacing fires, but also occasionally marked the occurrence of patchy spot fires in redcedar groves. Conversely, when scarred trees occasionally were found on steeper slopes, the scars typically represented a burn margin effect rather than significant underburning. In fact, a general lack of old scarred trees served as initial evidence of the typically high fire severities in these forest types. The paucity of scars made it necessary to utilize incomplete fire intervals in overmature stands as the best evidence mean fire frequency (Barrett and Arno 1988).

Seventy-two age class- and scar samples were obtained from 18 sites, yielding a continuous fire history record back to about 1715 (table 2). The oldest tree age estimates were obtained from recently cut stumps in redcedar groves, where dominants date back to the 1500s or earlier. The Master Fire Chronology (1715-1910) contains 8 fires, mostly stand replacing events. One exception is the 1910 fire, which scarred a few redcedars in creek bottoms

adjacent to large stand replacing runs immediately west of the analysis area. Three of the 8 fires in the chronology initiated the bulk of today's age class mosaic, between 1805 and 1884. Mean fire interval for the study area was 28 years between 1715 and 1910, and the actual intervals ranged from 11 to 55 years. The current interval of 83 years represents the longest since 1715, perhaps reflecting some influence from area fire suppression.

At the stand level, the lack of fire scars and predominance of single-age stands (i.e., seral component) verified that stand replacement, rather than underburning, was the major severity type in these moist forests. In terms of stand fire frequency, the estimated mean for replacement fires was about 291 years for the moist redcedar cover type, and about 216 years for the drier mixed conifer cover type on upland slopes (table 2). However, some redcedar stands also contain fire scarred trees, indicating that low intensity underburns occasionally occurred in creek bottoms and ravines. The underburns averaged about 90 years in redcedar groves and intervals ranged widely, from 20 to 200 years. Unlike in even-age lodgepole pine stands, this wide range suggests that fire occurrence in uneven-age redcedar stands is not dependant upon predictable sequences of succession (e.g., early post-fire reburn periods). Conversely, since scars in steep upland stands represented primarily a burn margin effect, the statistic for underburn frequency in the mixed conifer cover type (table 2) is not particularly meaningful.

Because the mean for stand replacing fires is based largely on today's maximum stand ages, it is possible that longterm fire suppression has added as many as 6 decades to the current lengths of some fire intervals. But this remains an open question, given the lack of more-reliable evidence. Overall, however, the estimated fire frequencies for the Fern Star area are comparable to those from similar old forests elsewhere in northern Idaho (Arno and Davis 1980). Moreover, based on the fact that stands have potentially long lifespans

in this forest zone (Cooper et al. 1987), insufficient time has passed for unnatural succession to occur even if suppression has promoted some mosaic homogeneity. On steep slopes in the analysis area, much of the current age class mosaic is between 150 and 200 years old. Most of these highly productive stands are relatively vigorous and exhibit only occasional signs of decadence, such as scattered groups of beetle-killed Douglas-fir. However, these and other fire history data (Arno 1980, Arno and Davis 1980, Barrett 1982) suggest that most relatively old stands today would readily support stand replacing fire during severe fire weather.

In terms of ecosystem management, several of these fire history concepts might be useful for developing management strategies for redcedar- and upland mixed conifer stands. First, this relatively small old growth forest occurs in an area with a known history of extensive forest fires. Consequently it is logical to expect that stand replacing fires will occur in some stands within the relatively nearterm future. To the extent that some Fern Star stands currently are valued for their old growth status, continued fire suppression might well be a viable, if tenuous, management policy--at least until the Idaho Wilderness debate is resolved.

The fire regimes data also might be useful for prescribing ecologically appropriate silviculture for the Fern Star and similar forested areas. First, unlike in drier forests occupied by ponderosa pine, the concept of "restoration siliviculture" is not applicable to this area because most stands are still within the natural range of succession. For steep upland stands, the fire severity patterns suggest that even age silviculture would be the most appropriate approach, for example, by using shelterwood- or seed tree systems to emulate the effects of past stand replacing fires. Aerial photographs can help guide the selection of unit boundaries, first, by examining the fire-generated mosaic then by targeting the oldest stands for initial treatment

(i.e., where old growth is not a primary value). However, rather than producing very large even age stands, maintenance of a diverse mosaic of differentially aged, sized, and treated polygons might serve as the best way to mitigate such problems as soil movement. In redcedar groves, uneven age management, possibly including use of prescribed fire, would serve as an ecologically appropriate silvicultural system. Sporadic and discontinuous underburns occasionally killed individual trees, as well as small groups of trees, but these fires often were non-lethal and did not markedly affect stand fuel- and overstory structure. Such underburning also apparently helped maintain relatively open understories in portions of redcedar groves, therefore, prescribed fires would be useful for slash reduction, maintenance of wildlife habitat, and other objectives.

Table 2 . Fire occurrence data from 18 plots in the THPL- and PSME-ABGR-MIXED CONIFER cover types, Fern Star Analysis Area, Clearwater National Forest.

THPL COVER TYPE:

Plot No.	Habitat Type	Aspect	Fire Intervals UB	SR	MFI		Last Fire
1	Thpl/Adpe	SE	200	300+	-		1884
4	Thpl/Adpe	W	57,24,55,26	245+	41	40.5	1910
5	Thpl/Atfi-Adpe	E	120	200+	-		1910
16	Thpl/Atfi-Atfi	S	68,101	278+	85	84.5	1884
18	Thpl/Atfi-Atfi	W	-	300+	-		1693
19	Thpl/Atfi-Atfi	S	185	430+	-		1563

MAFI:
SR Fires: 291 yr.
UB Fires: 93 yr.

PSME-ABGR-MIXED CONIFER:

Plot No.	Habitat Type	Aspect	Fire Intervals UB	SR	MFI		Last Fire
2	Thpl/Clun-Mefe	N	-	188+	-		1805
3	Thpl/Clun-Clun	NW	-	188+	-		1805
6	Thpl/Clun-Clun	W	-	230+	-		1763
7	Thpl/Asca-Asca	NW	42,133	363+	88	87.5	1805
8	Thpl/Clun-Clun	W	-	188+	-		1805
9	Thpl/Clun-Mefe	NW	186	363+	-		1816
10	Thpl/Clun-Mefe	NW	186	363+	-		1816
11	Tsme/Clun-Mefe	N	-	177+	-		1816
12	Abgr/Clun-Clun	S	-	169	-		1884
13	Abgr/Asca-Asca	SW	-	109+	-		1884
14	Abgr/Clun-Phma	S	-	278+	-		1715
15	Thpl/Clun-Clun	N	68	177+	-		1884

MAFI:
SR Fires: 216 yr.
UB Fires: 107 yr.

HUNGRY-MILL ANALYSIS AREA

An approximately 10,000 acre area comprising a steep river breaks zone (2000-4000 ft. elev.) was sampled in the lower South Fork Clearwater River drainage, primarily in the Hungry-Mill Analysis Area and drainages immediately west (Clearwater Ranger District, Nez Perce National Forest). Logging and severe fires in this century (fire atlas data on file) have progressively reduced the amount of old growth in the lower South Fork, but the analysis area contains a comparatively large amount of contiguous old stands. This portion of the river canyon has a generally east-west orientation, and substantially different forest vegetation occupies the opposing canyon slopes. For example, the relatively dry south-facing stands on the north side of the canyon are dominated by ponderosa pine and Douglas-fir, typically either PSME/SYAL or dry PSME/PHMA habitat types (Cooper et al. 1987). Before 1900, relatively open canopies and sparse understories were maintained by frequent non-lethal underburns, and most stands had comparatively low stocking of uneven-age ponderosa pine. During the fire suppression era (post-1935), many old growth stands have developed understory ladder fuels, whereas past high-graded stands currently have dense single-layer canopies of pole-size trees. Conversely, sites on the north-facing side of the canyon are considerably more productive (e.g., ABGR/PHMA, ABGR/CLUN h.t.s) and are dominated by multiple seral age classes of ponderosa pine, Douglas-fir, and western larch. Without fire, these understories rapidly become invaded by dense layers of shade tolerant conifers and tall shrubs.

In contrast with the White Sand and Fern Star Analyis Areas, fire scarred trees are abundant throughout the South Fork's river breaks zone. Ninety-seven fire scar- and age class samples were obtained from 27 sites, yielding a relatively continuous fire history record back to about 1664 (table 3). The Master Fire Chronology for the pre-suppression era (1664-1935) contains an

estimated 36 fires. Eight fires occurred after 1935, but 6 apparently were suppressed spot fires, and the remaining 2 fires were manager-ignited underburns. The pre-1935 mean fire interval was 8 years for the analysis area, with a suggested interval range of 3 to 29 years between fires in the drainage. However, these estimates probably are slightly conservative because the sample trees undoubtedly did not successfully record every light underburn.

In terms of stand fire occurrence, sampling revealed that substantially different frequency and severity patterns occurred on dry versus relatively moist aspects (table 3). For example, lightly stocked and largely uneven age ponderosa pine predominated on dry south slopes (e.g. PSME/SYAL h.t.), and individual scarred pines had up to 20 fire scars each. Also attesting to the longterm recurrence of non-lethal underburns, maximum tree ages on unlogged sites often exceeds 350 years. Pre-1900 mean fire intervals for 6 relatively dry stands ranged from about 10 to 25 years long (interval range: 3-40 yr.). On average, however, these stands have not burned during the past 91 years (table 3). On one such site, high-graded earlier in this century, a rough ocular estimate of tree density was made: old stumps and snags of varying diameters suggested that pre-1900 stocking was less than 10 trees per acre, while today's stocking of poles exceeds 200 trees per acre. Indeed, from a distance these relatively young, single-layer stands resemble even age lodgepole pine, and likely will burn with similar high intensities during future wildfires. As discussed below, this apparent shift toward less frequent- and higher intensity fires forebodes a dire future for many ponderosa pine stands in the South Fork and elsewhere.

Converse to the fire regime pattern on dry aspects, ponderosa pine-dominated stands on relatively moist aspects (e.g., dry grand fir h.t.s) typically contain 2 or 3 seral age classes that regenerated after mixed severity underburns. For example, scarred trees usually had, at most, from 2

to 4 scars each. Also attesting to the recurrence of mixed severity fires, moist-site stands rarely have dominants older than 200 years. Mean fire intervals ranged from about 30 to 45 years in the sample stands, and actual fire intervals ranged from about 20 to 60 years long. However, 16 of the 20 moist-site stands have not burned in a century or more, and the overall mean was 105 years since last burn. In fire's absence, dense understories of tall shrubs, saplings, and poles have developed under old tree canopies. And, while most stands still appear to be relatively vigorous, bark beetles have killed substantial numbers of Douglas-fir in the lower South Fork.

To summarize fire history during this century, most dry-site stands in the analysis area have experienced a five- to tenfold increase in fire interval length, while most moist-site stands have experienced at least a threefold increase. The Master Fire Chronology between 1664 and 1935 contains only 3 fire-free decades, but numerous fires have been suppressed in this century (unpub. data on file). Moreover, the area's last important fire occurred 104 years ago (1889), by far the longest fire interval recorded on any given sample site during the past 300 years. (Spring underburns recently have been conducted in some stands, but have not achieved any significant fuel reduction beyond the herbaceous layer). Before 1900, 4 fires (1889, 1869, 1855, 1802) initiated the bulk of today's age class mosaic on northerly slopes, and 3 of these fires burned between 50% and 94% of all sample sites. This illustrates the canyon's propensity for supporting extensive fires, but the past mosaic of widely differing fuels assured a wide range of severities during any given fire event. However, because of today's increased fuels, most aspects would readily support stand replacing fire during future wildfires. As one example of a possibly worst-case scenario, between 1967 and 1991 four large stand replacing fires occurred on south-facing slopes just west of the sample area, near Castle Creek. Several were double- and triple burns on sites that presumably had

experienced mostly light underburns before 1900. Subsequently, the lack of tree and shrub cover on these dry sites probably was a major factor contributing to the massive soil movement event that occurred in Castle Creek in 1993. (Moreover, when large reburns occur on sites underlain by thin, easily erodible soils, forest succession can be set back for many decades, even with repeated plantings [Barrett 1982]). This fuel buildup issue is especially critical for the South Fork because much of the canyon is oriented toward drying summer winds, and has long been a major travel corridor subjected to frequent human ignitions.

The fire regimes sampling reveals difficult challenges for ecosystem management in the Hungry-Mill Analysis Area, and similar drainages. Unlike in forests represented by the White Sand- and Fern Star areas, the concept of "restoration silviculture" has direct applicability to many South Fork stands. Knowledge of past fire patterns can aid development of management strategies that return stands to a semblance of natural succession. For example, past high-grading practices and the subsequent shift toward infrequent severe fires well illustrate that even age silviculture is totally inappropriate for dry ponderosa pine stands. Since these ecosystems evolved with frequent underburns that helped shape uneven-age canopies, uneven-age management and maintenance underburning is indicated. Conversely, both even- and uneven age systems are ecologically appropriate for relatively moist sites in the river breaks, because past fires produced even age groups in a diverse mosaic. Initially, however, many stands would need to be heavily reconfigured. An aggressive fuel reduction program (e.g., commercial thinnings and prescribed fire) would help reduce the likelihood of widespread stand replacement burning during future wildfires. However, prescribed underburning without heavy thinning is not recommended. Such burns would either be ineffective, as has occurred during recent spring burns, or might be lethal in overstocked stands during more

critical fire weather. After the stand reconstruction period, the fire regimes information (table 3, Appendix) would serve as a natural guide for type of treatment and treatment scheduling.

Several examples of ecologically-sound silviculture can be found today in the Hungry-Mill Analysis Area. Recent logging on productive grand fir habitat types has removed large numbers of understory trees, as well as some overstory veterans that might otherwise have succumbed to fires in the absence of longterm fire suppression. Such stand treatments serve as an excellent model for ecosystem management in the lower South Fork drainage.

Table 3. Fire occurrence data from 26 plots primarily in PIPO-PSME and PIPO-PSME-ABGR cover types, Hungry-Mill Analysis Area, Nez Perce National Forest.

PIPO-PSME COVER TYPE:

Plot No.	Habitat Type	Asp.	Fire Chronology	No. Fires[6]	MFI	Interval Range	Yrs Since Last Fire
2	Psme/Syal	S	1725-1869	12	13	7-39	124
5	Psme/Syal	SE	1664-1899	25	10	3-17	94
6	Psme/Phma-Phma	W	1664-1955	13	24	7-42	38
8a	Psme/Phma-Phma	W	1688-1889	13	17	5-38	104
14	Psme/Syal	W	1738-1889	8	22	14-38	104
20	Psme/Phma-Phma	SE	1717-1910	14	15	5-39	83
				MEANS:	17	7-36	91

avg 3-42

PIPO-PSME-ABGR COVER TYPE:

Plot No.	Habitat Type	Asp.	Fire Chronology	No. Fires[7]	MFI	Interval Range	Yrs Since Last Fire
1	Psme/Phma-Smst	W	1802-1869	3	34	20-39	124
7	Abgr/Clun-Phma	W	1802-1889	3	44	20-67	104
8b	Abgr/Clun-Phma	N	1725-1876	7	25	11-63	117
9	Psme/Phma-Smst	W	1802-1889	4	29	20-35	104
12	Abgr/Phma-Phma	E	1802-1869	2	-	67	125
13	Abgr/Phma-Phma	E	1802-1869	3	33	28-39	125
15	Abgr/Phma-Phma	NW	1802-1893	4	30	4-67	100
16a	Abgr/Phma-Phma	E	1802-1889	4	29	14-53	104
16b	Abgr/Phma-Phma	E	1802-1889	4	29	8-67	104
17	Abgr/Xete	SE	1802-1889	3	44	20-67	104
18	Abgr/Phma-Phma	SE	1764-1889	5	31	25-55	104
19	Abgr/Phma-Phma	SE	1802-1935	5	33	13-67	58
21	Abgr/Phma-Phma	NE	1802-1889	3	44	20-67	104
22	Abgr/Phma-Phma	E	1802-1869	3	34	14-53	124
23	Abgr/Phma-Phma	W	1802-1869	2	-	67	124
24	Abgr/Clun-Phma	N	1802-1869	2	-	67	124
26	Abgr/Phma-Phma	E	1802-1962	2	-	160	31
				MEANS:	34	17-57	105

avg 4-160

[6] Primarily non-lethal fires.

[7] Includes non-lethal and mixed severity fires.

Table 3 (cont.)

PSME-ABGR-MIXED CONIFER:

Plot No.	Habitat Type	Asp.	Fire Chronology	No. Fires[8]	MFI	Interval Range	Yrs Since Last Fire
10	Abgr/Phma-Phma	NE	1781-1919	2	-	138	74
11	Abgr/Clun-Xete	N	1802-1958	3	78	74-82	35
25	Abgr/Clun-Xete	NE	1802-1993	1	-	191+	191
				MEANS:	78	74-137	100

[8] Includes lethal and mixed severity fires.

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APPENDIX

Preliminary fire regime types for north-central Idaho, incorporating data from 3 analysis areas and Barrett and Arno (1991).[9] Fire frequency- and severity patterns (also see tables 1-3) can be examined in conjunction with Kapler-Smith and Fischer (in prep), to predict the various successional pathways within a given fire regime type.

COVER TYPE	HABITAT TYPES (SERIES)	FIRE SEVERITY TYPE	MFI
Pipo-Psme	Pipo to dry Psme	Non-lethal	20
Pipo-Psme-Abgr	Moist Psme to dry Abgr	Mixed	30
Shrubfield-conifer	Moist Psme to moist Abgr	Lethal reburns	30
Thpl-(Tshe)	Moist Thpl, (Tshe)	Lethal & (non-lethal)	230 100
Psme-Abgr (mixed conif)	Dry Thpl, moist Abgr	Lethal & (mixed)	155 75
Psme-Piel-Abla[10]	Cool-moist Abla,Tsme	Lethal	190
Pico-Abla	Warm-dry Abla	Lethal & mixed	155 40
Pial-Abla	Abla- and Tsme/Luhi, Pial-Abla	Lethal & mixed	180 70
Laly-Piel-Abla	Laly-Abla	Lethal	180

[9] Pending possible future addition of data and a comprehensive classification for the Inland Northwest (ca. 1996).

[10] Includes Tsme-dominated lower subalpine stands.